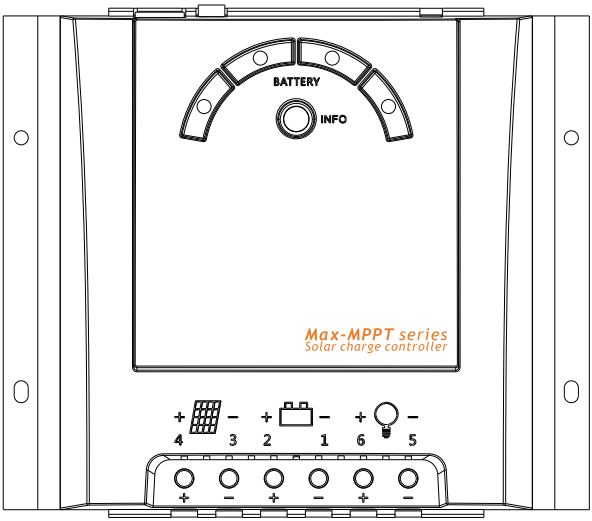
Max™-MPPT series
Solar charge controller

Max-MPPT1010: 10A , 100VDC max
Max-MPPT1510: 15A , 100VDC max
Max-MPPT2010: 20A , 100VDC max



User Manual

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Solar charge controller

Dear Clients,

Thanks for selecting the Max-MPPT series solar controller. Please take the time to read this user manual, this will help you to make full use of many advantages the controller can provide your solar system.

This manual gives important recommendations for installing and using and so on. Read it carefully in your own interest please.

1.Description of Function

Max-MPPT series solar controller is based on an advanced maximum power point tracking (MPPT) technology developed, dedicated to the solar system, the controller conversion efficiency up to 98%.

It comes with a number of outstanding features, such as:

- Innovative MPPT technology, conversion efficiency up to 98%
- Many choices of battery type and working mode
- Clear readable display of charge/discharge, battery and error description
- 12V/24V automatic recognition
- Temperature compensation
- Perfect EMC design
- Four stage charge way: MPPT, boost, equalization, float
- Full automatic electronic protect function

2.Safety instructions and waiver of liability

2.1 Safety

①The solar charge controller may only be used in PV systems in accordance with this user manual and the specifications of other modules manufacturers. No energy source other than a solar generator may be connected to the solar charge controller.

②Batteries store a large amount of energy, never short circuit a battery under all circumstances. We strongly recommend connecting a fuse directly to the battery to protect any short circuit at the battery wiring.

③Batteries can produce flammable gases. Avoid making sparks, using fire or any naked flame. Make sure that the battery room is ventilated.

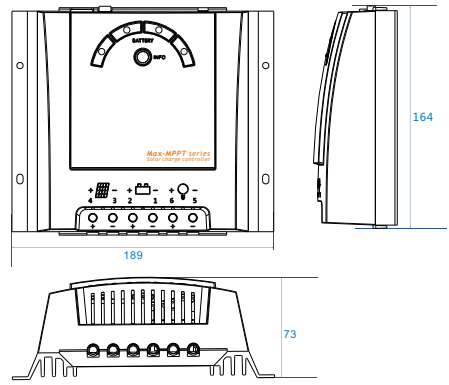
④Avoid touching or short circuiting wires or terminals. Be aware that the voltages on special terminals or wires can be as much as twice the battery voltage. Use isolated tools, stand on dry ground, and keep your hands dry.

⑤Keep children away from batteries and the charge controller.

2.2 Liability Exclusion

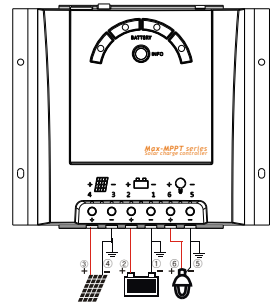
The manufacturer shall not be liable for damages, especially on the battery, caused by use other than as intended or as mentioned in this manual or if the recommendations of the battery manufacturer are neglected. The manufacturer shall not be liable if there has been service or repair carried out by any unauthorized person, unusual use, wrong installation, or bad system design.

3.Dimensions



4.Installation

The following diagrams provide an overview of the connections and the proper order.



- To avoid any voltage on the wires, first connect the wire to the controller, then to the battery, panel or load.
- Make sure the wire length between battery and controller is as short as possible.
- Recommended minimum wire size:
  10A : 2.5mm²; 15/20A : 4mm².
- Be aware that the negative terminals of Max-MPPT are connected together and therefore have the same electrical potential. If any grounding is required, always do this on the negative wires.
- Connecting capacitive load may trigger short circuit protection.

4.1 Mounting location requirements

Do not mount the solar charge controller outdoors or in wet rooms. Do not subject the solar charge controller to direct sunshine or other sources of heat. Protect the solar charge controller from dirt and moisture. Mount upright on the wall on a non-flammable substrate. Maintain a minimum clearance of 10cm below and around the device to ensure unhindered air circulation. Mount the solar charge controller as close as possible to the batteries.

4.2 Fastening the solar charge controller

Mark the position of the solar charge controller fastening holes on the wall, drill 4 holes and insert dowels, fasten the solar charge controller to the wall with the cable openings facing downwards.

4.3 Connection

We strongly recommend connecting a fuse directly to the battery to protect any short circuit at the battery wiring. Solar PV modules create current whenever light strikes them. The current created varies with the light intensity, but even in the case of low levels of light, full voltage is given by the modules. So, protect the solar modules from incident light during installation. Never touch uninsulated cable ends, use only insulated tools, and make sure that the wire diameter is in accordance with the solar charge controller' s expected currents. Connections must always be made in the sequence described below.

1st step: Connect the battery

Connect the battery connection cable with the correct polarity to the middle pair of terminals on the solar charge controller (with the battery symbol). If the system is 12V, please make sure that the battery voltage is within 10V~16V, else if the system is 24V, the battery voltage should between 20V~30V. If the polarity is correct, the LED on the controller will begin to show.

2nd step: Connect the solar module

Ensure that the solar module is protected from incident light. Ensure that the solar module does not exceed the maximum permissible input current. Connect the solar module connection cable to the correct pole of the left pair of terminals on the solar charge controller (with the solar module symbol).

3rd step: Connect loads

Connect the load cable to the correct pole of the right pair of terminals on the solar charge controller (with the lamp symbol). To avoid any voltage on the wires, first connect the wire to the load, then to the controller.

4th step: Final work

Fasten all cables with strain relief in the direct vicinity of the solar charge controller (clearance of approx.10cm).

5.Starting up the controller

5.1Self Test

As soon as the controller is supplied with battery, it starts a self test routine. Then the display changes to normal operation.

5.2System Voltage

The controller adjusts itself automatically to 12V or 24V system voltage. As soon as the battery voltage at the time of start-up is within 10V to 16V, the controller implies a 12V system, else if the battery voltage is within 20V to 30V, the controller implies a 24V system.

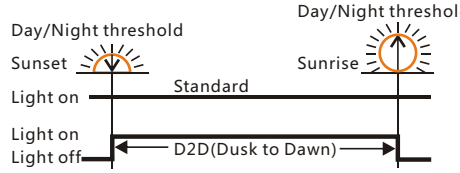
If the battery voltage is not within the normal operating rang(ca.10 to 16V or ca.20 to 30V)at start-up, a status display according to the section **6.2 Charge & Error display**.

5.3Battery Type

The Max-Spirit series controller applies to Liquid and Gel battery, the factory default setting is suitable for liquid battery.
Please refer to **7.1.2** change setting.

5.4 Work Mode

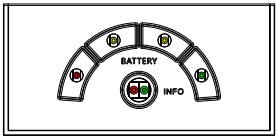
The work mode of the controller is selectable (Standard and D2D), the factory default setting is standard.
Please refer to **7.1.1** change setting.



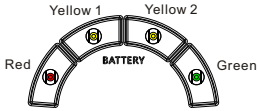
6.Display Functions

The controller is equipped with 6 LEDS.

In normal operation, the controller shows charge or discharge status, battery capacity and load status.



6.1 Battery Capacity display :



Red On, Energy of Battery <25%.

Yellow 1 On, Energy of Battery is about 25~50%.

Yellow 2 On, Energy of Battery is about 50~75%.

Green On, Energy of Battery is about 75~100%.

The percentage corresponds to the available energy until low voltage disconnect in relation to a fully charged battery.

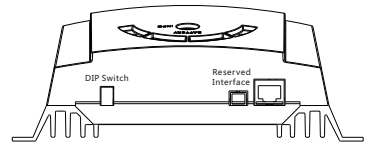
6.2 Charge & Error display (INFO) :

INFO green flashing, that is charging (fast flash for MPPT charge state, slow flash for non MPPT charge state); otherwise, no charge;

INFO Red On, is Error Status. For more details, please see table below.

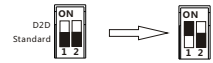
Error	Display	Reason	Remedy
Loads are not supplied	Red(INFO and Bat.) LED are lighted	Battery is low	Load will reconnect as soon as battery is recharged
	Red LED is flashing	Fast flash: over current/short circuit of loads	Switch off all loads. Remove short circuit.
		Slow flash: over temperature protection	Auto recovery when the temperature is below set value.
Battery is not being charged during the day	Green LED is off	Solar array faulty or wrong polarity	Remove faulty connection/ reverse polarity
Over voltage protection	Red(INFO) and Green(Bat.) LED are lighted	Battery voltage too high (>15.5V/31V)	Check if other sources overcharge the battery. If not, controller is damaged.
		Battery wires or battery fuse damaged, battery has high resistance	Check battery wires, fuse and battery.
Does not recognize the system voltage	All LED Lighted	The battery voltage is not within the normal operating rang at start-up	Charge or discharge the battery to make the voltage within the normal range

7. Interface Description

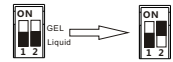


7.1 DIP Switch

7.1.1 DIP switch stall 1 -- Work mode (Standard and D2D) settings, the default is Standard(As shown in figure). If slide the DIP switch to "ON" , the controller works in D2D mode.



7.1.2 DIP switch stall 2 -- Battery type selection, the default setting is liquid battery (As shown in figure). If slide the DIP switch to "ON", the battery type is selected as GEL.



7.2 Reserved Interface

External temperature sensor and COM communication interface , please consult the supplier.

8.Safety Features

	Solar terminal	Battery terminal	Load terminal
Reverse polarity	Protected *1	Protected *1	Protected *2
Short circuit	Protected	Protected *3	Switches off immediately
Over current	——	——	Switches off with delay
Reverse Current	Protected	——	——
Over voltage	Max.100V *4	Max. 40V	——
Under voltage	——	——	Switches off
Over temp.	switches off the load if the temperature reaches the set value.		

*1 Controller can not protect itself in a 24V system when polarity of battery or solar is reversed.

*2 Controller can protect itself, but loads might be damaged.

*3 Battery must be protected by fuse, or battery will be permanently damaged.

*4 The solar panel voltage should not exceed this limit for a long time as voltage protection is done by a varistor.

Warning: The combination of different error conditions may cause damage to the controller. Always remove the error before you continue connecting the controller.

9.Technical Data

Technical Data	**Max-MPPT1010**	**Max-MPPT1510**	**Max-MPPT2010**
System voltage	12V/24V automatic recognition		
Max solar current or load current	10 A	15 A	20 A
Max MPPT efficiency	98%		
Max PV input power	12V: 150W ,24V: 300W	12V: 225W, 24V: 450W	12V: 300W, 24V: 600W
Float voltage	13.7V/27.4V (25℃)		
Boost voltage	14.5V/29.0V (25℃)		
Equal voltage	14.8V/29.6V (25℃) (Liquid)		
Day/Night threshold	5.0V/10.0V		
Load disconnect voltage	11.2~11.8V/22.4~23.6V		
Load reconnect voltage	12.5V/25.0V		
Battery type	Liquid, Gel		
Work mode	Standard, D2D(Dusk to Dawn)		
Temperature compensation	-4.17 mV/K per cell (Boost and Equal charge), -3.33 mV/K per cell (Float charge)		
Max solar voltage	100 V		
Max battery voltage	40 V		
Dimensions/Weiht	164*189*73mm / 800g	164*189*73mm / 900g	
Max power consumption	10mA		
Temp. Range during operation	-35℃ ~ +55 ℃		
Storage temperature	-40℃ ~ +80 ℃		
Relative humidity	10%~90% Non-condensation		
Case protection	IP22		